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ABSTRACT

This document unites two comprehensive policy statements by the National Educational Research Policy and Priorities Board. "Investing in Learning" was first published in June 1999 and the followup, "Investing in Research," is published for the first time in this volume. "Investing in Learning" follows a thematic approach in establishing research goals and objectives that will support a high level of achievement for all students. Recommendations are grouped into these areas: (1) priorities are set and activities are problem centered; (2) high standards of quality are created and upheld; (3) work is collaborative and rigorous; (4) design for rigorous research; and (5) mission is congruent with resources. "Investing in Research" takes a more pragmatic approach in pointing out where improvements might be made in existing institutions and where new arrangements are needed to promote knowledge development and to apply research findings to high priority areas. This set of policy recommendations addresses the urgency of increased rigor in education research, questions about the federal government's organizational arrangements, and the policy setting and leadership functions for research. (SLD)

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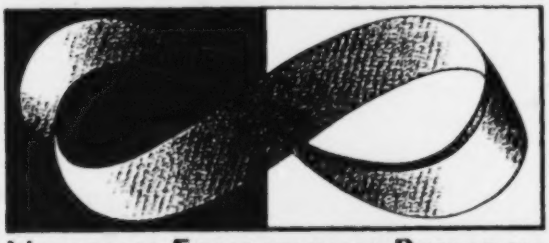

NATIONAL EDUCATIONAL RESEARCH
POLICY & PRIORITIES BOARD

Investing in Learning

A Policy Statement with Recommendations on Research in Education

Investing in Research

A Second Policy Statement with Further Recommendations for Research in Education

TM034726

National Educational Research Policy and Priorities Board
U.S. Department of Education

U.S. DEPARTMENT OF EDUCATION
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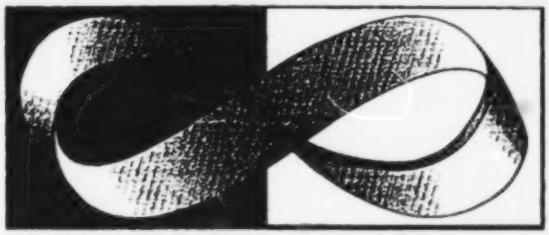

NATIONAL EDUCATIONAL RESEARCH
POLICY & PRIORITIES BOARD

Investing in Learning

A Policy Statement with Recommendations on Research in Education

Investing in Research

A Second Policy Statement with Further Recommendations for Research in Education

National Educational Research Policy and Priorities Board
U.S. Department of Education
Washington, DC 20208–7564

September 2000

U.S. Department of Education
Richard W. Riley
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September 2000

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Dear Colleague:

The present document unites in a single volume two comprehensive policy statements by the National Educational Research Policy and Priorities Board. *Investing in Learning* was first published in June 1999, and its follow-up, *Investing in Research*, is being released today. Together these papers summarize the findings and conclusions of the Board with regard to the federal role in support of educational research.

Since 1995, the 15-member Board has worked collaboratively with the Assistant Secretary for the Office of Educational Research and Improvement (OERI) to forge a national consensus with respect to a long-term agenda for educational research, development, and dissemination. We have come to a point at which the agency's authorizing legislation is under review by the Congress, and when a new administration is imminent. Therefore, we feel a distinct obligation, based on our experience, to present our recommendations as a blueprint for progress.

Investing in Learning follows a thematic approach in establishing research goals and objectives that will support a high level of achievement for all students. *Investing in Research* takes a more programmatic approach in pointing out, in the first place, where improvements might be made in existing institutions, and secondly, where new arrangements are needed both to promote knowledge development and to apply research findings to high priority areas.

Readers are encouraged to respond and to address their comments to

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Sincerely,

Kenji Hakuta

The National Educational Research Policy and Priorities Board

The National Educational Research Policy and Priorities Board (NERPPB) is authorized by the Educational Research, Development, Dissemination, and Improvement Act of 1994. The Board works collaboratively with the Assistant Secretary for the Office of Educational Research and Improvement (OERI) to forge a national consensus with respect to a long-term agenda for educational research, development, dissemination, and the activities of the Office. The Board regularly reviews, evaluates, and publicly comments upon the implementation of its policies by the U.S. Department of Education and the Congress.

The Secretary of the U.S. Department of Education appoints members of the Board. They represent the research community, school-based professional educators, and indivduals who are knowledgeable about the educational needs.

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Foreword

The National Educational Research Policy and Priorities Board (NERPPB) is charged by Congress to advise the United States on the federal educational research and development effort. Since its establishment by the Educational Research, Development, and Improvement Act of 1994, the Board has undertaken systematic investigation on the dimensions and scope of educational research and development, much of which has been carried out under the auspices of the Office of Educational Research and Improvement (OERI) of the U.S. Department of Education and by its predecessor, the National Institute of Education. We have emerged from this study more firmly convinced than ever of the importance of sound, cumulative research in education.

At the same time, we must acknowledge that there are serious shortcomings in the present research and development system in education-in its funding, structure, organization, approaches, and even its goals and objectives. Apart from our own firsthand observations of OERI and other federal agencies, we have consulted widely with the key stakeholders-educators, families, and researchers—about the changes and improvements that will correct our course and lead us to the advancements that we seek.

This document is the first comprehensive statement on research in education that draws on our own systematic inquiry over the past 4 years. We have made recommendations for legislative and administrative changes that we are convinced are necessary to improve the research, development, and communication of research activities sponsored by the federal government. We hope these findings will be helpful and constructive, particularly in light of the consideration by this Congress of the authorization of the Office of Educational Research and Improvement.

Readers are encouraged to respond and to address their comments to National Educational Research Policy and Priorities Board, 80 F Street NW, Suite 100, Washington, DC 20208-7564; *E-mail: nerppb@ed.gov*

Kenji Hakuta
Chair
National Educational Research Policy and Priorities Board

Acknowledgments

The Board extends its thanks to the many individuals and organizations that have generously shared their expertise and insights with us over the years. Special thanks to Emerson Elliott for assisting in the formulation and organization of this policy document.

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Investing in Learning:
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Summary of Recommendations

Goal: Priorities Are Set and Activities Are Problem-Centered

1. *Student achievement*—The priority for research in education must be a high level of achievement for all students, and, within that domain, the initial emphasis should be on *reading and mathematics* achievement.

2. *Reading, second language learning, and mathematics*—Recent reports from the National Research Council, *Preventing Reading Difficulties in Young Children*, and *Improving Schooling for Language-Minority Children: A Research Agenda*, synthesize strong bodies of research knowledge. A similar study on mathematics is currently under way. In each case, research is needed now to analyze how the results of our knowledge can be implemented in school programs and what factors lead to success or to difficulties. In reading, research is needed on how students become facile at reading complex text as they transition to advanced academic subjects such as history, social science, mathematics, and science. Research in both short- and long-term effects of specific education interventions for English language learners is needed, as well as techniques of assessment to measure competence, and transition points, from the first oral language to English; from oral language to literacy; and from literacy to the academic discourse of specific disciplines. In mathematics, research is needed on why students have so much trouble making transitions (e.g., from concrete objects to more abstract ideas), understanding formal representations, multiplicative reasoning, and essential mathematical and statistical concepts, such as chance, randomness, and probability.

3. *Organization for learning out of school*—To take advantage of different learning environments in which children from impoverished backgrounds often display more competence than in school settings, research is needed to design and test different models of after-school and summer programs to motivate, engage, and benefit children of low-income families. Work is also needed on types and features of after-school opportunities that most effectively motivate academic achievement and positive self-estimations; and how to design and test different models of

collaboration between schools and community groups dedicated to providing strong learning environments for poor children.

4. *Organization for learning in school*—Retention, pull-out remediation, tracking, and segregated special education programs that stratify by race, class, and gender opportunities to learn do not result in high achievement for all students. A more complete inventory of knowledge about effective practices for teaching academically challenging curricula with groups is needed, both for school populations in general, and for heterogeneous groups in particular. Research is needed on questions of time for children to master challenging curricula, supportive school structures, and expectations for the breadth and depth of content. Within each of these is the question, do students from middle-income families, as well as from low-income, ethnic, and linguistic minority backgrounds, benefit from each organizational practice? An important area of inquiry is whether there are academic benefits to classroom diversity—does diversity improve subject-matter learning?

5. *Linking changes in teaching practice with improved student learning*—Information is needed that can guide teachers and institutions who want to change their educational practice, particularly to reduce inequities in the opportunities of students who differ in socioeconomic status, ethnic background, and gender to learn successfully. This is especially important regarding the achievement of deep intellective competence advocated in current educational reforms. Such research would examine fundamental issues about the nature of teaching and learning, including, but not limited to, the importance of the skills and knowledge of teachers. We need to expand our knowledge and understanding of teaching practices, including teaching tools, such as assessment, that are successful with students who bring different cultural resources to their own and others' learning. Research would examine, much more so than in the past, issues of what it takes to do effective and successful teaching with diverse populations of students.

6. *Linking teachers' professional development and teaching practices*—Research is needed to understand what effective teachers do and how they do it. Successful teaching involves not only the exercise of skills and application of knowledge but also flexible improvisational adaptation in the classroom. Research is needed to understand the roles of increased knowledge and comprehension of subject-matter concepts and methods, the role of thorough understanding of the curriculum in the subject both

at the level one is teaching and in relation to other disciplines and grade levels, as well as the role of understanding students' learning in improving teaching practice. Research should also investigate how the structure of teachers' work supports or hinders their "on-the-job" learning and what kinds of abilities are learned in particular situations that can transfer to other settings.

7. *Understanding and supporting successful professional development*—There is need for a better understanding of teachers' development as "professional learning," and of teaching as a "learning profession." The model of learning how to teach, which is prevalent today, namely, that knowledge goes in during teacher education or professional development and then comes out in the teachers' own classrooms, does not account for the engagement of teachers themselves in improving the practice of their profession. What teachers need to learn to put reforms in place is not separable from their actual teaching practices or from the development trajectories of their careers. Research needs to examine ways in which people of diverse cultural, ethnic, and socioeconomic backgrounds are attracted to careers in teaching. How can professional development resources help support diversity in the teaching profession as well as improve practice? Further research on teachers' communities of practice is needed, building on findings that norms of responsibility and collegial efforts at professional problem solving are the most critical factors in improvement of teaching and learning.

Goal: High Standards of Quality Are Created and Upheld

8. *Standing panels*—Standing panels should be established to review proposals for each OERI institute. These would be comprised of 25 to 30 members, but with some overlapping membership, so that problems that cross boundaries can receive informed attention and that members of one panel with special knowledge could be invited to serve on another.

9. *Panel membership*—Panels should represent a broad range of perspectives. They must include members with strong disciplinary and methodological expertise. Across OERI panels, gender, race, ethnicity, and geographic diversity must be respected. Panel members should generally be nationally recognized figures.

10. *Standards for panelists*—The Board continues to support peer review standards adopted by OERI, with Board approval, which stipulate that all reviewers meet three criteria: demonstrated expertise, including training and experience in the subject area of the competition; in-depth knowledge of policy or practice in education; and in-depth knowledge of theoretical perspectives or methodological approaches in the subject area of the competition.

11. *Distinguishing between field-initiated and directed competitions*—OERI should distinguish between field-initiated competitions and those that are directed, rather than trying to combine the two.

12. *Funding for peer review*—The allowable percent of funds to support peer review should be increased so that the necessary standing panels and logistical support can be provided.

13. *Definitions*—The term "research" should be more narrowly defined than it is in the 1994 law so that the boundaries of focused competitions for research can be limited. Research should emphasize basic research in education as well as investigations, experiments, and inquiry to develop new knowledge or apply tested knowledge. It should exclude development, planning, and demonstrations. The term "national significance" needs to be clarified through regulations or in legislative language so that reviewers understand that it includes research opportunities, not only important problems identified by educators.

Goal: Work Is Collaborative and Rigorous

14. *Collaboration across federal agencies*—The Assistant Secretary for OERI should extend efforts to join with other federal agencies, and perhaps foundations, to collaborate on common agendas.

15. *Coordination of research within the U.S. Department of Education*—The Secretary should encourage, and the Assistant Secretary for OERI should provide special attention to performing a visible and constructive role in collaboration and coordination of education research within the Department.

16. *Linking ongoing research and practice-related efforts*—The Assistant Secretary should develop constructive means through which OERI, the

Research and Development Centers, and the Regional Educational Laboratories can function closely together to maximize their collective impact.

17. *Synthesis activities*—OERI should support synthesis activities across all-important fields of educational research, summing up progress continually and drawing implications for policy and practice.

18. *OERI staff*—The Assistant Secretary needs to determine the responsibilities most appropriate to accomplish the research functions of OERI, both to advance its work and to attract, retain, and continuously nurture staff with the requisite training and opportunities.

19. *Collaborative problem-solving research and development*—OERI should begin development of a new design for research that would focus explicitly on solving specific current problems of practice and at the same time be accountable for developing and testing general principles of education that can "travel" to locations beyond those in which the research is done The central idea is to develop a system of support for projects in which professional researchers and professional educators share in the accountability for achieving success in improving educational practices and outcomes. These projects may also include program developers, curriculum specialists, or policy specialists. Initially, this effort might be launched through a "working group" to assist in designing specific parts of the priority research agenda for which this model would be best suited, the role of OERI and outside contractors or grantees, coordination across multiple sites, expectations as to scale and length of commitment and the like.

Goal: Mission Is Congruent with Resources

20. *Funding research in education*—Funding for educational research must be increased dramatically. An interim target should be to reach the level of 0.5 percent of our nation's expenditure for elementary and secondary education, about $1.5 billion annually, which was the amount proposed by the President's Committee of Advisors on Science and Technology. It would be feasible to reach this target over a 5-year period.

21. *Aligning resources and mission*—Over the next 5 years, OERI should work to make the resources and missions better aligned. The missions must be matched with money.

22. *Research supervision*—Some focal point should be created by Congress for research leadership that can span across administrations.

23. *Allocation requirements*—The allocation provisions for institutes and for types of support in the Educational Research, Development, Dissemination, and Improvement Act of 1994 should be removed.

I. Introduction

Research in Education

America's students fall far short of academic achievement levels that policy leaders, parents, the public, and the media believe are necessary to equip them for living, for active citizenship, and for productive employment in the 21st century. This is perhaps the most frequently repeated message Americans hear, see, or read about education. Rarely, however, is our nation told that research has proved that it can make a difference in the practice of education so that more students will learn effectively. Yet that has been the record. Members of the National Educational Research Policy and Priorities Board believe that investments in education research are justified, and, more important, that commitment to *substantial growth* in federal support of these investments is urgent. Without these investments, guidance for education policies and practices is too often left to uninformed opinion and unreasoned prejudice.

The Board has reached these conclusions as a result of experiences shared by the members since its establishment in March 1995. It has carried out the duties assigned in law, many of them in collaboration with OERI, commissioned studies and evaluations, and consulted with many individuals. Representatives of scholarly organizations, schools, advocacy groups, and governmental agencies have briefed the Board about how research is carried on, what findings have been reported and analyzed, and how those findings have been put to use. Established under the Educational Research, Development, Dissemination, and Improvement Act of 1994, the Board has had responsibility to develop policies and priorities for research in education. This policy paper is the Board's first comprehensive statement on the federal effort in education research.

Two important trends provide the context for the nation's challenge to helping our youth reach acceptable educational performance standards and outcomes. The first of these is the rapid increase in the number of students "at risk" in school districts that are least able to marshal the human and financial resources to meet their needs. The demographic and geographic characteristics of projected growth in the youth population over the next 30 years suggest that virtually all of it will be concentrated in these "at risk" areas. But one should not suppose that our national challenge is confined to children at risk in deteriorating urban school systems. As the recent Third International Mathematics

and Science Study (TIMSS) has made clear, deficiencies in mathematics and science skills and knowledge extend to all students at all levels of relative proficiency, including those who live in well-financed districts with mostly majority population.

A second important contextual trend is the accelerating onrush of information technology. Already reaching into many aspects of the lives of students, the new technologies are increasingly shaping formal education, for better or worse, and reemphasizing disparities between the "haves" and the "have-nots." This trend is not simply a matter of access to computer hardware and software, vital as these factors are; it is also about the critical need to plan and integrate new technology into teaching and curricula, so as to expand and extend student learning.

These interacting trends represent a problem of immense national significance. The national educational enterprise in its many forms is widely and correctly understood to be a central device for the development of the knowledge, skills, and perspectives necessary to the success of our economy and the well being of our society. Education is also part of the glue that helps to bind us together as a community and a bridge across our many differences. Meeting these new challenges requires more than good will, energy, and resources. It also requires putting what we know to work and expanding our knowledge base so that our capacity to meet the challenges will be expanded. Trying to implement our hopes and our goals without careful research, testing, and development is likely to increase our frustrations without improving our performance.

In no way is research in education a quick and effortless path to success. Over the years, there have been many hard lessons to be learned. Educational improvement occurs slowly and in small increments no matter how powerful the research base behind it. Deep disagreements among prominent researchers are continual and perhaps inevitable. Professional educators have rarely become enthusiastic consumers of research. Weak designs and measures, combined with these professional doubts and disputes, have produced too many research results whose values and political implications are more prominent than their scientific validity. The educational research system has had powerful constraints and limitations on it, which have hindered numberless researchers and projects. The wonder is that educational researchers have been able to accomplish what they have.

Yet the accomplishments of research in education have been significant and their influence on education often wide. This perspective has been summarized in the report from a June 1998 conference on *National Directions in Education Research Planning,* which the Board sponsored jointly with OERI:

> Educational research has been used time and again, at critical junctures, to improve teaching and learning. Important examples range from John Dewey through constructivism, to Edward L. Thorndike through behaviorism and educational testing. . .

Education research has supported the design and evaluation of many governmental programs at all levels. Studies of learning and school organizations have had a major impact on teaching, assessment, and education reforms. Three recent reports from the National Research Council (NRC) that sum up what has already been learned and how it might be used in education include: *Preventing Reading Difficulties in Young Children*; *Improving Schooling for Language-Minority Children: A Research Agenda*; and *How People Learn: Brain, Mind, Experience, and School*. A recent, multifaceted set of research reports, the Third International Mathematics and Science Study (TIMSS), is the latest, most comprehensive, and most significant of a generation's progress in building comparative international assessments of learning and instruction. The widely acclaimed "Success for All" and projects of the New American Schools are demonstrating the practical and powerful effects that research can have when it is systematically applied in the classroom.

Our first conclusion from these and many other examples is that *research has a proven record in education*. Our second is that *federal support for education research is an investment that must be expanded several-fold*. Others have come to this second conclusion as well. For example, in a 1997 report, a panel of the President's Committee of Advisors on Science and Technology (PCAST) called for sharp increases in education research appropriations—reaching 0.5 percent of U.S. spending for elementary and secondary education. The report of the *National Directions* conference agreed that greater funding for research in education would be wise and productive:

> The prospect is that more confidence and opportunity could pay off handsomely, if the support is strategically provided.

The National Educational Research Policy and Priorities Board not only concurs, it has created this policy statement to describe critical elements of a strategic design for the federal government's role in education research.

Role of the National Educational Research Policy and Priorities Board

Congress created the Board as an external policy setting and advisory body for research in education. The Board sets priorities and approves standards. It also conducts reviews of OERI work, serves in a liaison capacity with the education research field and the public, and has responsibilities to strengthen the education research and development system. It enjoys substantial independence in gathering information, commissioning consultants, meeting with representatives of the education research system and consumers of that system, and, perhaps most importantly, communicating with the American public and Congress about education research. Among its specific responsibilities are the following:

- provide guidance to Congress in its oversight of OERI;
- review regularly, evaluate, and publicly comment upon, the implementation of Board recommended priorities and policies by the Department and the Congress; and
- advise the (people of the) United States on the federal educational research and development effort.

The operations of the Board are required to be collaborative—carried out in concert with the Assistant Secretary as well as with researchers, teachers, school administrators, parents, students, employers, and policymakers. Indeed, the concept of collaboration is emphasized both in the statement of Board responsibilities in the law (such as in policy and priorities setting) and in the categories for Board appointments mandated in the law, namely:

- education researchers, nominated by the National Academy of Sciences;
- outstanding school-based professional educators; and

- individuals who are knowledgeable about educational needs—parents, chief state school officers, local education agency officials, principals, members of state or local boards of education or Bureau of Indian Affairs school boards, and individuals from business and industry.

Ex officio members in addition to the Assistant Secretary for OERI include the directors of research for the Department of Defense and the Department of Labor; the directors of the National Science Foundation, the National Institutes of Health, the National Endowment for the Arts, and the National Endowment for the Humanities; the Librarian of Congress; and the director of the Office of Indian Education Programs at the Department of the Interior.

It is now 4 years since the first meeting of the Board. During that time the Board has carried out its responsibility to approve standards for review of grant proposals, evaluation of exemplary and promising practices, and evaluation of OERI's work. It has examined and made recommendations on the peer review system at OERI, crucial to ensure high-quality work. It has collaborated with the former Assistant Secretary to set initial priorities. It has reviewed solicitations for regional educational laboratories, the research and development centers, and other major initiatives. The Board members have also stepped back to evaluate their functions more broadly, both to determine the effects of what members have done and to assess directions for education research in the future, especially as the time comes for reconsideration of the authorization of OERI's research and development authorities. The following pages describe the findings and conclusions from these studies (section II) as background for Board goals and recommendations (section III).

II. The Board's Findings

The Board has conducted its efforts with a view of education research, development, and dissemination as bringing opportunity and promise to learning for America's youth. As the Board has surveyed the field of education research, it has tried to identify the major issues in the existing system—the longstanding problems and the increasing need for better returns from the investments in the system. It has grouped these in terms of resources, balance and linkage across the system, and processes.

Resources

Longstanding problems in education research start with insufficient resources. Limited funds have been spread thinly over a large number of topics and problems, rather than concentrated on fewer issues. OERI's national research institutes, created in 1994 to re-focus education R&D on important educational topics and problems, are a prime example. Notwithstanding some bright spots, the institutes lack sufficient internal staff to mount credible programs consistent with their mandates for comprehensive and high-quality work and to provide national leadership on critical issues. This means that the "critical mass" found in other research institutions to be necessary for an effective, high-quality program is missing. The Board's concern about critical mass extends to the national educational research and development centers, which in many instances have too few resources for the work and leadership expected of them. The regional laboratories, as well, have immense formal missions, but only modest resources to achieve them. Some of these institutions have addressed the critical mass problem by aggressive efforts to obtain resources from other sources, but they all still face a mismatch between ambitious missions and limited resources to meet those expectations.

If the quality, utility, and resources for education research are to improve, more effort, focus, and resources will be needed to strengthen the supporting infrastructure in three respects:

(1) The "demand" for research should be strengthened. Building effective demand will require a substantial effort to educate teachers about the value and use of education research. That effort will succeed, however, only if educators are participants in the planning and execution of research.

(2) More resources can be used to attract new, highly qualified scholars from many disciplines to educational research and its issues. Lack of resources and prestige now inhibit such recruiting.

(3) The institutions that undertake the critical work will need to be selected on merit, nurtured with sustaining resources and the demand for quality, and rigorously evaluated for performance.

The National Educational Research Policy and Priorities Board is not alone in its conclusion that education research is shamefully underfinanced. In 1997, the Panel on Educational Technology of the President's Committee of Advisors on Science and Technology (PCAST) made several recommendations to improve the quality of education in all subject areas. The report did not focus only on technology as a topic of study, but as a means to strengthen content and pedagogy in education, enhance professional development, and increase student learning. The Panel called for a large-scale program of rigorous, systematic research on education in general and educational technology in particular. It recommended an investment equal to at least 0.5 percent of our nation's expenditures for elementary and secondary education—about $1.5 billion annually—a five-fold increase over what the Panel identified as the current level. That figure was contrasted with the pharmaceutical industry's investment in research of an amount equal to 23 percent of all U.S. expenditures for prescription and non-prescription medications.

Balance and Linkage

The involvement of teachers and other education professionals in knowledge-building and implementation activities is stimulating new thinking about the design and conduct of research in education. It is increasingly clear that teacher acceptance of and success in revised practice is strengthened by understanding and involvement. This realization is leading toward efforts to seek active participation of teachers, schools, and districts in the research and development planning, and conduct and evaluation process. Some refer to this as creating "learning organizations." In this role, the education professional community becomes vested in the objectives of the innovation and reform, provides helpful input in fitting concept with operational reality, and contributes a continuing basis for accountability and mid-course correction.

The span of activities authorized for OERI is very broad, from fundamental research through large-scale demonstration and effective communication of

knowledge and information to the practitioner community. But that very breadth carries consequences when the research investments that are needed to improve student learning are not congruent with task. The portfolio of the Department is aggregated in two areas: applied research and small-scale development; and communication activities. The Department conducts essentially no basic research, and is not deeply involved in large-scale development or demonstration, especially about comprehensive or standards-based reform. The cumulative science base supporting the applied agenda of the OERI and departmental R&D activities lacks clear visibility, which adversely affects its force and credibility. The OERI Institutes are contributing some of the important applied research aimed at comprehensive or standards-based reform, testing and assessment. The Department's participation in large-scale development has been generally modest. The pattern of foundation funding often mirrors the federal focus, although a few foundations are supporting large-scale comprehensive reform experimentation. Generally, foundations appear to give more focus to curriculum and teaching topics than the federal programs. It is the Board's impression that the fit and relationship between foundation and federal funding are more happenstance than intentional. The absence of substantial large-scale development activity aimed at critical problems with rigorous research and evaluation is noticeable. This concern is particularly strong in light of the continuing difficulties of scaling up small, promising developments that require systemic change for widespread success. Providing knowledge of effectiveness at a large scale is an important insulation against faddism and insufficiently tested ideas.

Turning to dissemination, OERI's work most frequently has followed traditional approaches, no longer believed adequate, which leave to those in need of exemplary practice and sound knowledge the burden of finding it. This is particularly true for those undertaking large-scale comprehensive reforms. Even with the Internet and other forms of user-friendly electronic access, the passive systems do not fully meet the needs of those with ambitious innovation agendas, and the volume of information can overwhelm the practitioners involved. The more intensive efforts appear to require a combination of traditional dissemination, technical assistance, and short-term applied research or problem solving. A new set of intermediaries and adjustments in existing organizations are emerging to meet these needs, and dissemination must be reconceptualized in this broader context.

The Board has learned that fundamental research—largely in the cognitive and neural sciences—is conducted in other federal agencies, most notably the National Institute of Child Health and Human Development (NICHD), the

Office of Naval Research, and to a lesser degree the National Science Foundation (NSF). There is also modest foundation support for basic educational research. The location and level of fundamental research is of concern in several different ways. It is not desirable that basic research be sponsored or conducted in one organizational framework, but it is important that such work be linked to the applied research and ultimate practitioner communities that will exploit and make use of its findings. Sound linkage requires that staff in applied research organizations are sensitive to implications of the findings and are qualified to design the applied and related basic research needed to push sound findings toward utilization. Such linkage requires continuing identification of application problems and unmet needs from practitioner and applied research communities. Efforts to link across organizational performers are occurring more frequently, such as recent planning work concerning a new initiative among OERI, NICHD, and NSF.

The research planning processes in Education are newer and less well articulated than those for Defense and Health. Department plans set forth broad goals and objectives, and do a particularly commendable job of relating research and development efforts to mission objectives. But they are unlike the Defense and Health counterparts in two undesirable ways. First, they are much clearer about the mission and application goals than about the research goals and priorities. Second, there is a strong sense in the defense and health cases that the science base is firmly rooted, and that there is a clear sense of direction and cumulative learning. Moreover, in those cases, the growing knowledge base is a powerful determinant of both future research and operational actions. There is no such comprehensive sense for education research and development. These differences are in part attributable to the huge difference in resources among the three agencies, which inevitably affects the style that has been adopted. But more than just staff and dollar resources are at issue; there is also the question of whether the education research and development program is an endless series of small applied research projects unrelated to an evolving critical set of knowledge bases or a cohesive agenda of cumulative knowledge-building. By this criterion, these other federal agencies are better developed.

Processes

The Board's review of the current education research system included specific attention to important processes by which agendas are set, support is mobilized, resources are allocated, and progress is achieved, assessed, and made known. The experiences and models in other federal R&D programs provide insights for assessment of OERI's work.

- *Balance of researcher initiatives with national focus*: The first area is agenda setting, in which two important objectives need to be harmonized. On the one hand, long experience suggests that R&D is most productive if researchers are given substantial latitude in initiating work on their own ideas or perceived problems, generally known as field-initiated research. On the other hand, there is a strong and continuing need to give the R&D agenda a sense of national focus and priorities aimed at the most important gaps in our knowledge and the most promising research approaches. OERI has adopted several devices to create the desired harmony, yet the national focus part of the balance remains weaker than it should be. Education lacks a process similar to that employed in NIH, for example, that could ensure a continuing dialog among OERI, the Institutes, Centers and Regional Laboratories plus other important education research institutions and sponsors about critical research problems and opportunities.

- *Respect for research as well as for policy decisionmaking*: A second issue centers on mobilization of support. Given the importance of federal funds in education R&D, garnering support means the involvement of the federal political process. Respect for the appropriate domain and responsibilities of the research community and political policymakers is both necessary and is accomplished in other federal R&D programs. Where it works well, all parties are engaged in setting broad objectives and parameters of the work, while leaving specific design and execution of the projects to the sponsoring agency and the research and practitioner communities.

- *Meeting high standards of quality:* The third issue is development of appropriate research methodologies and the establishment of standards of evidence to be applied to knowledge-building activities. More rigor is clearly desired and needed in education research. Traditional rigorous methodologies such as randomized experiments may not routinely be feasible, affordable, or appropriate in education research, though control group methodology has a continuing and important role in the clarification of uncertainty about critical research issues. Members of the Board believe that further efforts are needed to define appropriate research designs. The choice is not between randomized techniques and nothing at all. There is an appropriate level of rigor associated with the stage and purpose of the research being undertaken.

III. The Board's Goals and Recommendations for Educational Research

In the 1994 "Educational Research, Development, Dissemination, and Improvement Act," Congress set forth a powerful challenge for education research and for the National Educational Research Policy and Priorities Board:

> The Congress declares it to be the policy of the United States to provide to every individual an equal opportunity to receive an education of high quality . . . To achieve (that) goal . . . requires the continued pursuit of knowledge about education through research, development, improvement activities, data collection, synthesis, technical assistance, and information dissemination. While the direction of American education remains primarily the responsibility of State and local governments, the Federal Government has a clear responsibility to provide leadership in the conduct and support of scientific inquiry into the educational process . . . The failure of the Federal Government to adequately invest in educational research and development has denied the United States a sound foundation of knowledge on which to design school improvements . . . (The) National Educational Research Policy and Priorities Board should . . . work collaboratively with the Assistant Secretary to forge a national consensus with respect to a long-term agenda for educational research, development, dissemination, and the activities of the Office.

As a result of its studies, and its meetings with teachers, educators, researchers, policymakers and others, the Board has reached consensus on four goals that are critical to meet the challenges expressed by Congress in the 1994 legislation. These goals are statements about characteristics of research in education. If the goals were reached, there would be a sound basis for trust in the results and growing support for conduct of research. The Board's goals are:

- Priorities are set and activities are problem-centered.
- High standards of quality are created and upheld.

- Work is collaborative and rigorous.
- Mission is congruent with resources.

The sections below provide additional information about each of these goals and make recommendations for action to achieve them.

Priorities Are Set and Activities Are Problem-Centered

In the Board's work with the Assistant Secretary to establish a priorities plan, and its subsequent efforts to refine and target priorities, it has found that a problem-centered focus for research for developing research agendas works best. That is, identifying real problems faced by teachers in real classrooms is the most understandable way to design and target appropriate research. The principal priority should be teaching and learning and, more specifically, improved achievement for all students. But balanced research agenda setting must also give weight to identification of research opportunities—where research is poised for advances. The targets for action should be ones for which there is reason to be optimistic that research has something important to say, or could have, with the proper investment.

Together, the Board and OERI sponsored a 1998 conference on "*National Directions in Education Research Planning*" that brought together leaders and representatives from a dozen or more research-planning efforts under way among federal agencies, professional and scientific organizations. Its purpose was to put individuals associated with those efforts into communication with one another and with the educators and policymakers who could use the fruits of education research to enhance learning and suggest appropriate priorities and collaborations for current and future work.

The overriding sense of the conference was that educational research planning must emphasize focus and selectivity. The Board heard a consensus among conference participants that education research should be concentrating its inquiries on those areas that the public and the profession believe are important, as well as anticipating problems that will become important. Among the conferees, the appropriate topics were identified as reading and language learning; expanded attention to mathematics; the dynamics of teacher performance

and effectiveness in schools and classrooms; and new emphasis on technology and telecommunications; international studies; and learning in family, community, and workplace settings.

Student Achievement

Members of the Board believe that the focus of research attention must be narrower still, in order to concentrate on something both important and possible.

> *Recommendation 1: Student Achievement*—The priority for research in education must be *high achievement for all students* and, within that domain, the initial emphasis should be on *reading and mathematics* achievement.

Raising student achievement is a priority for education supported alike by parents, business leaders, public officials, and educators. But to *attain* high achievement for all students requires success in combating the most difficult and challenging issues of student performance across America. These are issues sharpened for us once again, recently, by international comparisons from the TIMSS in which both the strengths and the shortcomings in achievement among our youth are apparent. TIMSS data indicate that our younger children, age 9, demonstrate mathematics and science knowledge and skill at levels approximating those of children in other economically developed countries. But as they progress through the school system, they fall farther behind, so that by 12th grade, American students are among the lowest scoring students in the study. Before the TIMSS results were released, we may have been able to take comfort that our most able students ranked with those of other nations, but that has now been disproved as well. The TIMSS results repeated findings from the National Assessment of Educational Progress (NAEP) and other sources, showing that achievement of children from minority backgrounds and from low-income families, on average, continues to lag far behind that of the majority population.

These characteristics of student achievement—that (1) it is below levels experts believe necessary for maintenance and preservation of American democracy and for full participation in a vibrant economy in the 21st century, and (2) that there are unacceptably wide gaps across members of our population—are longstanding and have resisted well-intentioned attempts over many years to remedy. Members of the National Educational Research

Policy and Priorities Board believe that the combined efforts from researchers across several disciplines, developers, and teachers can make a difference if student achievement is the priority.

We have called on the National Academy of Education (the Academy) to provide assistance in forming a research agenda around high student achievement, one that would build on what is already known, and one that would capture the most promising areas for further exploration. The Academy was asked to create a possible agenda on a series of focused research questions. The Academy has suggested three strands of work. The first strand is research on *learning*, especially across *transitions* in children's lives; the second on *teaching in relation to learning* as a professional practice to support student learning; and the third, strengthening the *links between educational research and the practice of schooling*. The first two are discussed in this section on priorities and problem-centered activities. The third is discussed below under collaborative work because it is directed toward constructing more powerful methodologies for conduct of research in education—not only in the area of high achievement for all students, but other topics as well.

The ability of the United States to make substantial progress toward the goal of high achievement for all students is limited by assumptions about the nature of research, learning, and teaching that cause policymakers and practitioners to neglect important complexities associated with education. It is, for example, usually assumed that the results of researchers' investigations should have important practical implications, whether or not the researchers are trying to improve educational effectiveness. Regarding students' learning, students are usually assumed to learn procedures and facts independently of their comprehension of the concepts and principles that make them understandable, and students' learning in school is assumed to occur independently of their abilities and personal identities outside of school. Teachers are assumed to develop skills and subject-matter knowledge independently of the social and cognitive challenges they deal with in their classrooms as they interact with students. In fact, however, the relations among all these factors must be better understood, and to do so, education must be thought of as a complex professional undertaking.

Transitions

In the first strand of its measures for focusing research on high achievement for all students, the Academy has advised us that the most critical and promising research questions fall into two areas. One involves transitions that students

must accomplish in order to progress successfully through the school curriculum. The other concerns transitions that involve the social organization of learning in schools and its relation to the activities of students outside of school.

The Board recommends that research on teaching and learning in school be focused on critical transitions that include important developments in conceptual understanding as students move through the school curriculum, and as they move between the school and other communities. To achieve at high levels, students must succeed in critical transitions that require mastery in general aspects of knowing and understanding that are often not explicitly taught. The expectations in school for these general aspects of understanding and learning do not match with the experiences of all students, and the transitions are much easier for students for whom the school routines and practices are in close alignment with those that prevail at home. The difference is generally unfavorable to students of low-income families.

> *Recommendation 2: Reading, second language learning, and mathematics*—Recent reports from the National Research Council, *Preventing Reading Difficulties in Young Children*, and *Improving Schooling for Language-Minority children: A Research Agenda*, synthesize strong bodies of research knowledge. A similar study on mathematics is currently under way. In each case, research is needed now to analyze how the results of our knowledge can be implemented in school programs and what factors lead to success and difficulties. In reading, research is needed on how students become facile at reading complex text as they transition to advanced academic subjects such as history, social science, mathematics, and science. Research in both short- and long-term effects of specific education interventions for English language learners is needed, as well as techniques of assessment to measure competence, and transition points (a) from the first oral language to English, (b) from oral language to literacy, and (c) from literacy to the academic discourse of specific disciplines. In mathematics, research is needed on why students have so much trouble making transitions (e.g., from concrete objects to abstract ideas), understanding formal representations, multiplicative reasoning, and essential mathematical and statistical concepts such as chance, randomness, and probability.

High achievement for all students will not be accomplished by policies and practices that consider only students' activities in school without taking account

of the competencies that students, especially students from backgrounds of poverty, develop in other aspects of their lives. Several recommendations focus on ways in which the social arrangements of learning in school, as well as the content of school learning activities, need to be studied and understood to inform policies and practices that can lead to high achievement for all students.

> *Recommendation 3: Organization for learning out-of-school*—To take advantage of learning environments in which children from impoverished backgrounds often display more competence than in school settings, research is needed to design and test different models of after-school and summer programs to motivate, engage, and benefit low-income children. Work is also needed on types and features of after-school opportunities that most effectively motivate academic achievement and positive self-estimations; and how to design and test different models of collaboration between schools and community groups dedicated to providing strong learning environments for disadvantaged children.

> *Recommendation 4: Organization for learning in-school*— Retention, pull-out remediation, tracking, and segregated special education programs that stratify by race, class, and gender opportunities to learn do not result in high achievement for all students. A more complete inventory of knowledge about effective practices for teaching academically challenging curricula with groups is needed, both for school populations in general, and for heterogeneous groups in particular. Research is needed on questions of time for children to master challenging curricula, supportive school structures, and expectations for the breadth and depth of content. Within each of these is the question, do students from middle-income families as well as students from low-income, ethnic, and linguistic minority backgrounds benefit from each organizational practice? An important area of inquiry is whether there are academic benefits to classroom diversity—does diversity improve subject-matter learning? (Note: Recommendation #5 addresses teaching practice aspects of school organization for learning.)

Teaching and Learning

The second strand of research to promote high student achievement in reading and mathematics is teaching as a professional practice. Without improving our

understanding of what it will take to produce a well-prepared and professional corps of teachers, school improvement will not be possible. Students living in poverty and ethnic minorities have been historically underserved by American educational institutions and are an increasingly large proportion of the student population. No one doubts that teachers will have much to learn in the years to come in order to be successful in helping all students reach high levels of achievement. There should be a particular concern with producing new knowledge about connections between professional development and improving education for currently underserved populations; namely, children and adolescents whose experiences and dispositions do not match with the expectations and social organization of schools.

Recommendation 5: *Linking changes in teaching practice with improved student learning*—Information is needed that can guide teachers and institutions who want to change their educational practice, particularly to reduce inequities in the opportunities of students who differ in socioeconomic status, ethnic background, and gender to learn successfully. This is especially important regarding the achievement of deep intellective competence advocated in current educational reforms. Such research would examine fundamental issues about the nature of teaching and learning, including, but not limited to, the importance of the skills and knowledge of teachers. Expansion is needed in our knowledge and understanding of teaching practices, including teaching tools such as assessment, that are successful with students who bring different cultural resources to their own and to other students' learning. Research would examine, much more than past research has done, issues of what it takes *to do* effective and successful teaching with diverse populations of students. (Note: Recommendation #4 addresses the school organization context in which effective teaching for student learning takes place.)

Recommendation 6: Linking teachers' professional development and teaching practices—Research is needed to understand what effective teachers do and how they do it. Successful teaching involves not only the exercise of skills and application of knowledge but also flexible improvisational adaptation in classroom circumstances. Research is needed to understand the roles of more profound knowledge and comprehension of subject-matter concepts and methods, both at the level one is teaching and in relation to other disciplines and grade levels, as well as the role of

understanding processes of students' learning. Research should also investigate how the structure of teachers' work supports or hinders their "on-the-job" learning and what kinds of abilities are learned in particular situations that can transfer to other settings with different circumstances.

Recommendation 7: Understanding and supporting successful professional development—There is need for a better understanding of teachers' development as "professional learning," and understanding teaching as a "learning profession." The prevalent model of learning how to teach—the knowledge goes in during teacher education or professional development and then comes out to be used in the teachers' own classrooms—does not account for the engagement of teachers themselves in improving the practice of their profession. What teachers need to learn to put reforms in place is not separable from their actual teaching practices or from the development trajectories of their careers. Research must examine ways in which people of diverse cultural, ethnic, and socioeconomic backgrounds are attracted to careers in teaching and how professional development resources can help increase and maintain diversity in the teaching profession, while continuing to improve practice. Further research on teachers' communities of practice is needed, building on findings that norms of responsibility and collegial efforts at professional problem solving are the most critical factors in improvement of teaching and learning.

Assessment

Focusing the research agenda as the Board has suggested means that some important topics will not receive much attention. For example, such areas as cultural and political contexts of schools, educational policy, and school finance; education governance; and learning environments and educational technology—all of them areas in which important work might be done if sufficient resources become available—would not receive significant attention under the Board's view of priorities.

Among all the topics that would be deferred under the Board's identification of priorities to achieve high achievement for all students, one that the Board would single out as *a candidate for inclusion at the earliest opportunity is assessment of teaching and learning for purposes of accountability.*

Accountability is an increasingly important issue in educational research and practice. Current accountability measures, however, do not match the goals of most educational reforms for students of low-income families, especially those reforms aimed at improving their complex thinking and participation in activities of inquiry and understanding. One issue to be considered is the limitations of norm-referenced tests that are conventionally presented in standardized, multiple-choice formats. Criterion-referenced measures, aligned with teaching and learning standards, may assess the competence of these students more productively than norm-referenced tests. Alternative methods that are responsive and valid guides for instruction of students who come from a background of poverty should be developed and studied as soon as adequate funding can be attained.

High Standards of Quality Are Created and Upheld

The single criterion by which any scientific enterprise must be judged is the quality of its work. Scientific norms must be known and shared. The expectations for explicit hypotheses, sound designs, appropriate measures, sufficient data of good quality, and logical analyses must be widely shared. High standards must be insisted upon in all areas of a scientific agency's work—in selection of proposals, design of appropriate methodologies, creation of research agendas, identification of effective and promising practices, and evaluation of all efforts it conducts or supports.

The primary means by which high standards have been developed and assured in federal agencies has been through extensive networks to assure involvement of peers. Peer review is much more than a bureaucratic instrument. It is a major vehicle of communication between the government and the field, a process through which principles about research priorities and technical quality of research are clearly articulated, and applied to proposals. In the 1994 legislation, Congress made its intent clear that a peer system must be applied to every aspect of OERI's work. The law requires:

> that a system of peer review be utilized by the Office—for reviewing and evaluating all applications . . . which exceed $1 million; . . . evaluating and assessing the performance of all recipients of grants; . . . cooperative agreements and contracts; . . . and for reviewing and designating exemplary and promising programs . . .

In addition, the law requires OERI to adopt, and the Board to approve:

> such standards as may be necessary to govern the conduct and evaluation of all research, development, and dissemination activities carried out by the Office to assure that such activities meet the highest standards of professional excellence. In developing such standards, the Assistant Secretary shall review the procedures utilized by the NIH, NSF, and other federal departments or agencies engaged in research and development and shall actively solicit recommendations from research organizations and members of the general public.

While the work of the Board since 1995 has frequently centered on the preparation and approval of those standards, the Board has also undertaken a review of the set that has been in place longest—standards for approval of grants—to determine (a) whether the standards are appropriate and useful; (b) whether they contribute to fair and high quality competitions; (c) how the process worked and how it might be improved; and (d) what recommendations might be made on how to configure and maintain peer review panels.

In this assessment of operation of the standards in fiscal years 1996 and 1997 and in two types of competitions—field-initiated studies and Research Centers—Board members learned that as many as a third of reviewers had not conducted research in education, even though that is a requirement in the standards. Among those who might have had research training and had themselves conducted research, that training and research experience was in broad topical areas related to the competition, but not necessarily in the methods and design of research in the proposals. In examining the reviews provided by OERI panelists, the Board-commissioned study found that most reviews provided little depth in their commentaries. Reviews were most detailed about project design and significance, least detailed on staffing, budget, and management plans. Applicants frequently disagreed with reviewer comments, saw the comments as superficial or irrelevant, found a lack of comments about design, and cited a lack of examples. Applicants also noted limited explanations and mentioned large discrepancies among reviewers. They believed that proposals had not been carefully read and said that comments were illegible.

Standing Panels

As a result of this review, the Board's principal recommendation on research quality is addressed to the establishment of standing panels.

Recommendation 8: Standing panels—Standing panels should be established to review proposals for each OERI Institute. These would be comprised of 25 to 30 members, but with some overlapping membership, so that problems that cross boundaries can receive informed attention and so that members of one panel with special knowledge could be invited to serve on another Institute panel.

This is the Board's most urgent and important recommendation on peer review processes, and it can be implemented by OERI on its own authority both easily and relatively quickly. Standing panels, frequently used by such organizations as NIH, offer the most compelling mechanism the Board could find to improve the quality of the review process. Standing panels provide continuity from the announcement of government funding opportunities to the decisions on proposals to fund. They provide an informed group to build areas of research over time so that the results are cumulative rather than episodic. Such panels can attract experienced members who will agree to serve, because the repeated contacts with colleagues are more professionally rewarding than membership in ad hoc settings. They can provide a forum where the accumulating knowledge can be sifted and interpreted, and new lines of research can be identified.

Thus, standing panels are a device to attract the very people whose judgment is needed to ensure that research proposals are of the highest scientific merit and are addressed to high priority national education needs. They can also play a crucial role in guiding and evaluating the direction of research.

The Board has additional recommendations that complement and support the standing panels.

Recommendation 9: Panel membership—Panels should represent a broad range of perspectives. They must include members with strong disciplinary and methodological expertise. Across OERI's panels, gender, race, ethnicity, and geographic diversity must be respected. Panel members should be nationally recognized figures.

Recommendation 10: Standards for panelists—The Board continues to support peer review standards adopted by OERI, with Board approval, which specify that all reviewers meet three criteria: "(a) demonstrated expertise, including training and experience, in the subject area of the competition; (b) in-depth knowledge of policy

or practice in education; and (c) in-depth knowledge of theoretical perspectives or methodological approaches in the subject area of the competition."

Enhancing Quality in Competitions

The Board has made further recommendations to the Assistant Secretary to enhance the effectiveness of reviewers, reduce workload for reviewers and applicants, and improve center competitions. For all grant competitions, it is important that the quality of research designs be rated by reviewers with appropriate technical expertise. The Board strongly prefers that each proposal be read by a minimum of five people. More logistical and other support should be provided for reviewers along with more in-depth training, and better formats should be created in the technical review form to guide the reviews. Reviewers should be expected to provide specific, but not necessarily detailed, feedback to applicants. Reducing workload for both reviewers and applicants would enhance the likelihood of accomplishing these changes. For example, the Assistant Secretary should consider making grant announcements and appointing submission dates earlier in the fiscal year; reducing the number of full applications through use of preliminary applications; reducing the number of pages permitted for center applications and the page limit for attachments; assignment of specific primary, secondary, and tertiary reviewers to applications; and conduct a small pilot project to determine how technology might be used to support the peer review process.

For center competitions specifically, the Board has urged the Assistant Secretary to clarify the project design criterion so that reviews address the end projects proposed as well as the overall center design; increase weighting for management and clearer instructions; and provide planning grants. These changes require modifications in regulations.

The Board also has recommendations for enhancing peer review processes that may require changes in the 1994 Act.

> *Recommendation 11: Distinguishing between field-initiated and directed competitions*—OERI should distinguish between field-initiated competitions and those that are directed, rather than trying to combine the two.

Recommendation 12: Funding for peer review—The allowable percent of funds to support peer review should be increased so that the necessary standing panels may be established and logistical support provided.

Recommendation 13: Definitions—The term "research" should have a narrower definition than it has in the 1994 law so that the boundaries of focused competitions for research can be limited. Research should encompass basic research in education as well as investigations, experiments, and inquiry to develop new knowledge or apply tested knowledge. It should exclude development, planning, and demonstrations. The term "national significance" needs to be clarified through regulations or in legislative language so that reviewers understand that it includes research opportunities, not only important problems identified by educators.

Work is Collaborative and Rigorous

Collaborative Research

As noted in section I, the 1994 Act sets the tone for collaboration in all of OERI's work, including that of the Board in its relationships with the Office and the Assistant Secretary. OERI should conduct all its work in ways that bring diverse perspectives constructively together. This includes the perspectives of researchers, educators, policymakers, the public; representatives of the nation's diverse populations and cultures; federal agencies participating in the conduct of education research, as well as states, foundations, and the private sector. To the extent appropriate for each function, this range of perspectives should be represented in all of OERI's activities, from developing agendas, to selection of awardees, oversight, evaluation, and refinement.

OERI has an important place in research in education throughout the Department and across the government. This is defined by Congress in broad terms in the 1994 legislation. For example, the law sets forth a coordination role for the Assistant Secretary and OERI:

> With the advice and assistance of the Board, the Assistant Secretary shall work cooperatively with the Secretary and the other Assistant Secretaries of the Department of Education to establish and maintain

> an ongoing program of activities designed to improve the coordination of education research, development, and dissemination and activities within such Department and within the Federal Government.

The law goes on to specify the goals of minimizing duplication, maximizing the value of federal investment, and enabling entities in education research to interact effectively as partners.

But OERI is limited in its abilities to achieve this role. It provides, for example, only a small part of the total support for education research and development. A study prepared for the Board estimated U.S. spending for research in education in the range of $900 million to $1 billion through the U.S. Department of Education and among foundations. A larger net that includes investments in education studies and data collection in other federal agencies such as the Department of Defense, the Department of Health and Human Services, and the National Science Foundation, as well as state and local governments and universities might add another billion. With a $2 billion level of annual expenditures for education research activities, the nation would be investing less than 0.5 percent of the total enterprise in educational knowledge-building. However, the OERI share represents only about one-fifth of that of the Department and about one-twentieth of the $2 billion estimated national education research investment.

Aside from the level of investment is the question of OERI's span of activities in education research. To be blunt, OERI is only one among several agencies involved in significant support and or conduct of education research. Within the Department, research related to individuals with disabilities and education of children with disabilities is considerably larger. The Department of Health and Human Services conducts research on learning, family structure, integrated service delivery, and funds dissemination activities related to education. The Department of Labor funds research on dropouts and illiteracy, and funds dissemination activities related to education. The National Endowment for the Humanities funds research and dissemination on students' knowledge of history and the humanities. The National Science Foundation has worked on the teaching of math and science, NIH in learning disabilities and reading, and the Office of Naval Research (ONR) in cognitive and neural science and technology.

These simple facts have impressed upon the Board that the almost unbounded role envisioned for OERI in the 1994 legislation creates unachievable ends. OERI is not a monopoly, not the most significant element, not the leading

federal influence in several prominent substantive areas. The reality is that OERI must carefully balance its own initiatives and its collaboration with other federal agencies, foundations, and states and localities.

In the coordination of Department research and in exercise of its authorities for government-wide collaboration, OERI and the Department, nevertheless, have vital strengths that all the government agencies can respect, in that they:

- retain substantial credibility and utility as convenors—they can bring people together;
- maintain unparalleled connections with the nation's educators and education policymakers; and
- support the policy goal of assuring that the nation's education resources are used effectively to provide opportunities to those individuals in our population who have traditionally not been served well.

OERI's strengths can often be used particularly well in combination with complementary attributes of other agencies. The Board makes the following recommendations simply to reinforce the letter and spirit of the 1994 OERI law:

> *Recommendation 14: Collaboration across federal agencies*—The Assistant Secretary should extend efforts to join with other federal agencies, and perhaps foundations, to collaborate on common agendas.
>
> *Recommendation 15: Coordination of research within the Department of Education*—The Secretary should encourage, and the Assistant Secretary should provide, special attention to performing a visible and constructive role in collaboration and coordination of education research within the Department of Education.

The Board does not view these as mere bureaucratic exercises. Every effort should be made to create constructive tasks for which it is to the advantage of all collaborators to join with the Assistant Secretary. Some examples of what the Board members expect might include (1) large areas of research that a single agency would not have the resources to undertake alone, (2) syntheses across important topics such as development or learning in which the research sup-

Recommendation 22: *Research supervision*—Some focal point should be created by Congress for research leadership that can span across administrations.

In addition to generally insufficient funding, the allocation of resources for OERI, particularly to and by the institutes, is heavily controlled by statutory and other distribution rules. These rules frustrate responsiveness to new needs and circumstances, fractionate limited funds, and inhibit response to new national priorities. In a well functioning system, these rules should not be necessary.

Recommendation 23: *Allocation requirements*—The allocation provisions in the 1994 Act for institutes and for types of support should be removed.

IV. Concluding Observations

To supplement its recommendations for research in education, the Board has some concluding observations about its own work, and particularly about how it can best be effective. The legislation that created the Board contains numerous references to "collaboration." In addition, the Board is required by law to "review regularly, evaluate and publicly comment upon" actions of the administration and Congress. Among provisions of the law is one that says the Board must be offered an opportunity to provide written comments on any proposed "grants, contract, or cooperative agreements" over $1 million, and those comments may cover both consistency of the proposed use of funds with the research priorities and the "methodology and approach of the proposed actions."

Taken together, these are potentially powerful authorities, although they must be exercised in balance with the resources the Board has available or can attain. On one occasion when appropriations exceeded the administration's budget request, the Board was invited to provide an overall analysis and make recommendations prior to Department decisions about use of these appropriations. The Board believes that was an especially effective interchange between the administration and the Board and one that permitted the Board to be both constructive in its comments and effective in its influence over the subsequent actions. However, there have been other occasions, such as preparation of the President's budget and the administration's proposals for a national voluntary test, on which the Board's involvement came not only after the decisions were made but after public debate had begun. These latter examples do not seem to demonstrate the collaborative relationship that the law seeks to establish. Even worse, perhaps, they fail to take advantage of the counsel the Board was created to provide. It is just that structure and those processes that the Board has used to prepare this policy statement. This is one concern.

Of greater importance, however, is the view of Board members that much has been accomplished during the past 4 years to serve as a platform for the future. The members have learned to work through the diversity of views that Congress wisely insisted be represented among the appointees. All have come to appreciate the potential of sound research in education as a means through which all American students can become better prepared for their lives in a new millennium.

Members of the National Educational Research Policy and Priorities Board appreciate the opportunity that Secretary Riley provided them through appointment to the Board to serve American education. They are committed to perform, and eager to continue, their special functions in policy and priority setting for education research.

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Investing in Research:
A Second Policy Statement
with Further Recommendations
for Research in Education

Investing in Research: A Second Policy Statement with Further Recommendations for Research in Education

In this second set of policy recommendations on research in education, the National Educational Research Policy and Priorities Board addresses

- the urgency of increased rigor in education research,
- several questions concerning the federal government's organizational arrangements, and
- the policy setting and leadership functions for research.[1]

The Board's initial policy paper, *Investing in Learning*, contains recommendations on building an education research system in the federal government. It envisions the Office of Educational Research and Improvement (OERI) performing primary functions, but acknowledges the extensive roles performed elsewhere in the U.S. Department of Education and other agencies—such as the National Science Foundation, the National Institute of Child Health and Human Development in the U.S. Department of Health and Human Services, and the U.S. Department of Defense. The Board addresses four topics essential to the development of capacity within OERI:

- structuring an agenda around a few critical problem-centered priorities;
- creating and upholding high standards of quality;
- conducting research in collaborative and rigorous fashion; and
- aligning the mission and resources of OERI.

Urgent as these topics are for OERI's research mission, they do not fully address other issues particularly salient to the legislative reauthorization cycle in which OERI now finds itself. For that reason, the Board has prepared this second set of recommendations.

Recommendation 1: Designing research for credible results—**Research in education should be conducted consistent with rigorous standards, reflecting scientific principles and appropriate for the matters being investigated. Congress and the Department should require annual state-of-research reports describing progress toward incorporation of rigorous research designs in all OERI program portfolios.**

In its previous policy statement, the Board asserted that the single criterion by which any scientific enterprise must be judged is the quality of its work. Scientific norms must be known and shared. The expectations for explicit hypotheses, sound designs, appropriate measures, sufficient data of good quality, and logical analyses must be widely shared. High standards must be insisted upon in all areas of a scientific agency's work—in selection of proposals, design of appropriate methodologies, creation of research agendas, identification of effective and promising practices, and evaluation of all efforts it conducts or supports.[2] The earlier statement also observes that education improvement occurs slowly and in small increments no matter how powerful the research base behind it. Among other things, research requires reflection, thinking through the evidence and its possible implications. Successful research in education also requires collaboration among researchers and educators. Weak designs and measures, combined with frequent professional doubts and disputes, have produced too many research results whose values and political implications are more prominent than their scientific validity.[3] The Board's conclusion in the earlier paper was, and remains, that more rigor is needed in education research.[4]

In fact, disagreements about what constitutes "rigorous" or "sound" research designs are continual and perhaps inevitable among prominent researchers. For example:

- A 1999 conference at the Brookings Institution titled "Can We Make Education Policy on the Basis of Evidence?" examined the use of experimentation in education.[5] The panelists argued that only an experimental design in which individual students are assigned randomly—a design long used in medicine—will yield sound answers to questions from educators, policymakers, and parents about how to improve the practice and results of education. Randomized assignment designs were referred to as the "gold standard" for developing believable results that will be accepted for action by policymakers because, the panelists argued, there is little controversy over the findings when such designs

are employed. Research in education was described by one panelist as dominated by faculty in schools of education and motivated by craft principles, not scientific principles. Panelists lamented a failure of Congress to insist on such gold standard evaluations of the education programs they are funding and claimed a lack of leadership in the U.S. Department of Education to insist on them.

- A contrasting perspective was expressed by Richard Murnane and Richard Nelson in a 1984 article in the *Journal of Economic Behavior and Organization* titled "Production and Innovation When Techniques are Tacit: The Case of Education."[6] Their argument was that effective teaching requires experimentation and problem solving activity every day. Moreover, they asserted, while school authorities may provide the context in which teachers teach, they cannot control in any detail what a teacher does, either through monitoring or incentives. It is a mistake, the authors argue, to think of education research and development (R&D) in the same way as industrial or biomedical R&D. Education R&D should not be perceived as an expert-based activity that happens outside schools, or an effort to create "programs that work." Instead, it should be part of the "problem solving, experimenting, evaluating, adapting to new contexts and goals that is always going on in education." The appropriate way to ask about the influence of research on practice, they claim, is "what are the ways in which the new math and the modern physics ideas have influenced what goes on in classrooms, and in what ways, and in what contexts have these individual innovations enabled teachers to teach and students to learn more effectively."

Such differences among scholars about concepts of what research in education *is* or *should be* cannot be resolved by legislative fiats, but only through the questioning, responding, and revising cycle of the field as it addresses actual cases. There is a need to examine appropriate designs for conduct of research in education by drawing from many academic disciplines and research methodologies. That examination should include insights that other fields of inquiry—such as biology and mathematics—can bring to illuminate the debate in education. Indeed, it should also involve policymakers and educators in order to deepen their understanding of how research may provide answers to their questions about education practice. The examination might produce a better understanding of what designs are appropriate for particular investigations than we now have, when vocal proponents of one approach or another overlook the larger context of learning and teaching, schools and communities. There is also need for rigorous explorations to find ways that

experimental methodology can be reconciled with the Murnane and Nelson perspective. One means would be through randomization at the classroom or school level. Another would be to conceptualize and test other experimental or quasi-experimental methodologies that can strengthen findings about significant issues of lasting importance.

In fact, recent OERI leadership has devised practical ways to advance understanding and use of appropriate research methodologies. The Assistant Secretary for OERI has initiated work through the RAND Corporation to create agendas for research in mathematics and reading that seek to build "balance" into future research plans. He has established study groups of nationally recognized experts in these fields who will sift through what has already been learned, and formulate plans for additional investigations. The goal is to have a research program in mathematics education and in reading education with rigorous research designs that can provide compelling, cumulative, and scientifically supportable findings. The designs for such research are to be *balanced* across all the studies in a program and *appropriate* for each separate investigation in a program. It is likely that the question of a balance in the mix of research methodologies will differ by field—that is, a "balance" for research in mathematics might require more theory building, while balance in reading might lend itself to theory-based "experimental" procedures that test the effects of specific models of instruction under particular circumstances.

The Assistant Secretary is placing emphasis in other areas of OERI to advance the accumulation of research findings that document what has been learned (and so build credibility with educators), as well as develop supportable research plans. He has done this through collaboration with the regional educational laboratories and research and development centers, and in the Interagency Education Research Initiative (IERI), a partnership with the National Science Foundation and the National Institute of Child Health and Human Development (NICHD). In the latter area, IERI supports projects exhibiting "rigorous, interdisciplinary research on large-scale implementations of promising educational practices and technologies in complex and varied learning environments" to improve pre K–12 student learning and achievement in reading, mathematics, and science. Projects are funded only if they meet tests for high standards of methodological rigor, sufficient scale, integrated use of technology, and conduct by interdisciplinary research teams. The program announcement states the research in these subjects "as a whole has lacked a convergent knowledge base that can inform systemic reform in a consistent and meaningful way. . . . Additionally, applicants are invited to take an existing body of research knowledge to the next level of investigation through efforts to extend such findings to complex educational settings."

With these points in mind, Board members summarize their views as follows: The power of science comes from a combination of strong theory and data that bear on the theory. This implies endorsement of explicit ideas and agreed-upon methods for exploring and testing these ideas based on observation that has internal and external consistency. Experiments, as a classification of research, should not be scattershot or universal. Rather, they should be justified by a cumulative record of rigorous observation and piloting. This requires knowledge of context in addition to adherence to scientific canons. While experiments in education may not be used as frequently as they should as a preferred means for investigation—for a variety of reasons, but availability of funds is surely one such reason—"science" should not be equated with "experiments." Nor should it be forgotten that a critical element of this cumulative record must be basic research that extends knowledge in topics central to teaching and learning. This approach may not solve problems immediately, but would develop underlying "leading indicators" and intervening variables necessary to make progress toward solving problems.

Members of the Board believe that actions of the OERI leadership as described above, and not a legislative prescription, will result in designs for research that have credibility and quality. The idea should be to create, in a program area, a portfolio of research that is designed to yield strong, research-driven findings with clearly stated implications for school and educational practice. Recommendation 1, then, calls for *rigorous research designs, appropriate for the matters being investigated.* It would require a chief of research in the Department to make annual statements on progress toward this goal.

> ***Recommendation 2: Using research knowledge*—Legislation should assign a major role to the chief of research in the U.S. Department of Education to conceptualize and carry out a program that connects research with practice so that student learning is advanced. The policy board (described in recommendation 6) should be charged with evaluation and monitoring progress under the plan for conduct of this strategy.**

This topic addresses how to foster use of research-based knowledge and applications in school settings, something that has been a challenge as long as the federal government has invested in research in education. Traditionally, the "solution" has been to view the connection of research to practice in linear fashion: research produces knowledge, developers use that knowledge to create materials or "programs" or training, and teachers/principals/superintendents and boards "implement" the research findings and development products.

Over more than 35 years, the federal government has established institutions to close the gap between what we know and what we do in education. For example, the Educational Resources Information Center (ERIC) system, the Regional Educational Laboratories, the Comprehensive Regional Assistance Centers, Regional Technology in Education Consortia, and Eisenhower Professional Development Federal Activities Program were created, at least in part, for this purpose. *Despite all of them, there is a persistent finding that good research does not influence practice as it should.*

In gathering data on this issue, the Board commissioned several papers and reviewed results from a conference on "Knowledge Mobilization and Use in Education" sponsored by the Assistant Secretary. Drawing on these resources and the broad experience of Board members themselves, the Board has identified three important elements for inclusion in a comprehensive dissemination strategy:

- *First, researchers must accept a responsibility for conducting their work in ways that will provide credible results, presented in understandable ways.* They must reach out to educators. For example, one particularly important activity is development of syntheses of research around important and enduring problems facing educators. Syntheses serve as a basis for technical assistance and to identify additional needs for research. Teachers and administrators must participate directly in such syntheses, not only as users of results but as co-shapers of research questions, designs, and interpretations. The efforts must not just summarize; they must also reach judgments about the respective worth of various research reports using a best evidence approach. Researcher and educator collaboration will assure that the summaries can be relevant, timely, and well focused.

- *Second, schools—and the leaders and teachers in them—must be engaged in continuous improvement efforts.* This implies that *educators will create a demand for the findings from research, as well as for access to the skills of researchers.* Studies of effective improvements in school and classroom practice have demonstrated that research will be used only when demand for it becomes more sophisticated, and when teachers and other educational staff are players in its adaptation on site. Dissemination is better seen as a process, not an event. Continuing school improvement involves searching for what can be learned from others—often through "networks" of contacts among teachers and researchers; questioning how teachers' work might lead to higher levels of student achievement; and data gathering, planning, piloting, and revising what teachers and school leaders do. This is a distillation process, drawing on both practice and research. The Department's research and dissemination efforts should encourage educators to use their own knowledge and that of others, and to reflect on what they have learned.

- *Third, preparation for the profession of teaching needs to equip teachers to understand and use research.* Preservice education of teachers has given virtually no attention to the understanding, use, and adaptation of research to enhance student learning. Yet such an understanding, and opportunities to practice continuing school improvement are essential to a new conception of "dissemination" not just as *access* to information, but as *adaptation and use* of findings from research.

The thread that binds together these three foundations for a new conception of dissemination is *"collaboration" among researchers, teachers, and school leaders.* Collaboration is the crucial common element from many current experiences that have come to the Board's attention—for example, the Consortium on Chicago School Research, several school reform "networks" such as the American Federation of Teachers (AFT) research and dissemination network, a study of work of the regional laboratories, and a recommendation to the Board from the National Academy of Education for "design-based, problem solving research." What many of these collaborations encourage is a willingness for all partners to learn from each other and to share responsibility for what is done. They often create a legacy of capacity building in the schools as well as a sharing of expertise and experience during the life of the collaboration.

What is missing at the OERI level is an overall strategy to fashion these three basic elements into a coherent whole. Creating such a strategy cannot be done by legislative mandate. A workable *strategy for moving from dissemination to use* of research needs to be an executive branch responsibility, because it must be developed with continuing participation of many individuals and organizations, and because it will require a sustained effort over time, with many mid-course modifications.

What is needed in the principal research office of the U.S. Department of Education is a capacity to conceptualize a program for moving research into practice. *This would be a program of research and developmental activities that inform the improvement of education practice and policy for greater student achievement.* Peer review panels, well-targeted development efforts, and relationships with consumer groups are required. The work should build cumulatively through *collaboration that makes research accessible* for educators and, at the same time, *creates a demand* for research. Recommendation 2, in summary, calls for conceptualization of a program that connects research with practice so that student learning is advanced. The plans and activities to foster use of research, under that program, should be evaluated and monitored on a continuing basis. The Board proposes language in recommendations 2 and 6 for conduct of this oversight function.

Recommendation 3: Federal focal point for research in education—**The U.S. Department of Education should have responsibility for support and conduct of research and development in education and for collaboration with other agencies.**

Members of the National Educational Research Policy and Priorities Board believe that the historic and basic purpose of the U.S. Department of Education is to support research and information collection, so that public discussion of education issues in America can be informed with facts and reliable analyses of data.

Some individuals have advised Congress to sever research functions from the Department and place them in an independent agency. Proponents of this idea argue that education research and data collection cannot be protected from political influences, retain credibility for the public, or build stability so long as it remains in the U.S. Department of Education. However, they have not said how a small and single-purpose education research and data collection agency would be shielded from inappropriate external policy influences. Such an agency would still be a part of the federal government and subject to budget, data burden, and policy review by the Office of Management and Budget (OMB) and to Congressional legislative and appropriation processes. Board members are not persuaded that the case for excising research functions from the Department is desirable, practical, or likely to result in strengthening the capacity for research.

The U.S. Department of Education is the primary agency charged with federal leadership and administrative functions in education. It bears a responsibility for functions that have been vested in the federal government for 133 years. When the first federal authorization for a "Department of Education" was enacted and approved in 1867, its entire role was:

> "collecting such statistics and facts as shall show the condition and progress of education . . . and diffusing such information respecting the organization and management of schools and school systems, and methods of teaching, as shall aid the people of the United States in the establishment and maintenance of efficient school systems, and otherwise promote the cause of education throughout the country."

In brief, it is not realistic that the U.S. Department of Education should give up its historic and fundamental responsibilities in research and data collection at a time when American citizens are demanding education services that will effectively and dependably lead to increased student achievement.

The view of Board members is that these responsibilities should be maintained in the U.S. Department of Education. Congress and the executive branch should concentrate not on relocating education research functions, but on strengthening and improving them by building the *capacity* of the Department's principal research arm. This will require building up the staffing and funding of OERI so it can perform its necessary functions— supporting research efforts; collaborating with researchers, educators, and policymakers; linking research with practice; and cooperating with other agencies that have responsibilities for certain aspects of research in education. The Board's other recommendations in this policy paper and its June 1999 predecessor are aimed at just that purpose.

Recommendation 4: Effective structure and staff capacity—Eliminate organization structure and funding mandates in the Educational Research, Development, Dissemination, and Improvement Act of 1994, and provide appropriate staff resources, so that units can support critical masses of quality work, consistent with Board priorities:

- Authorize the Secretary to form management groups around the principal problem-centered programs of the Department's education research organization.

- Alternatively, if the institute structure is retained from the 1994 Act, the Board would establish a clear priority for institutes that focus on functions assigned to the National Institute on the Education of At-Risk Students, and the National Institute on Student Achievement, Curriculum, and Assessment.

- The staffing resources of OERI must be strengthened so that responsibilities for planning, supporting, evaluating, and summarizing research can be distributed and adequately supported.

- The current funding allocation requirements should be removed. Provisions that earmark 25 percent of institute funds for field-initiated studies and one-third of all institute funds for university-based research and development centers have constricted sound plans for focusing on a limited number of research priorities. There are other funding prescriptions that should also be removed, including ones for institutes, coordination and synthesis, regional laboratories and rural

areas within them, research and development centers, the Educational Resources Information Center (ERIC) Clearinghouses, and field-initiated studies.

In its June 1999 policy recommendations, the Board proposes that the OERI mission and resources be aligned and that appropriation allocation set-asides and mandates for institutes and types of support be removed from the 1994 Educational Research, Development, Dissemination, and Improvement Act. The Board found an extreme mismatch between the available resources for the institutes compared with what was contemplated when problem-focused institutes were first conceived. It suggested that "it would be prudent if the Secretary had authority to modify the organizational structure" to bring about a better alignment. It also pointed out that the funding allocation rules frustrate responsiveness to new needs and circumstances, fractionate already limited funds, and inhibit response to new national priorities.[7]

The circumstances that led to these Board recommendations have not essentially changed in the last year. There is not a sufficient level of funding that can permit five institutes to support adequate levels of research or staff to be involved in significant ways with the field. If anything, the situation is more dire today. Board members are not opposed, in principle, to the categories for institutes as Congress created them in 1994, but believe that the realities of the situation must be faced.

Board members believe that the most compelling approach is to eliminate specific internal structures from the authorization law. Instead, there should be authority for the Secretary to create problem-centered management groups that would bear responsibility for conduct of priority activities for so long as they are needed. This would accommodate the current priorities for reading and mathematics initiatives, allow them to be refocused or eliminated over time, as appropriate, and permit creation of new management groups as priorities and resources make possible.

However, if the current legislative specification for institutes is retained, the Board would prefer stronger alignment of program priorities, funding, and missions assigned to the institutes. For that reason, the Board would identify the focus of missions for two of the 1994 Act institutes as organizational homes for the priorities described in its June 1999 recommendations: *a high level of achievement for all students, initially emphasizing reading and mathematics.*[8] Those would be the National Institute on Education of At-Risk Students and the National Institute on Student Achievement, Curriculum, and Assessment.

The Board speaks specifically about the critical need for rebuilding OERI staff in its previous policy paper. It describes the need for staff who can participate as peers in the scholarly community and work with users to facilitate the practical application of knowledge. It notes the leadership roles that staff play in other federal research agencies to advance the enterprise and, at the same time, attract and retain highly trained and capable individuals—roles such as conduct of research, synthesis of research, collaboration with external stakeholders, planning and designing cutting-edge research, organization of and participation in peer reviews, review of proposals for social utility or agency relevance, and evaluation of ongoing research.

OERI staff capacity and responsibilities have gone in opposite directions. Since the OERI reauthorization was enacted in 1994, OERI staff have declined from 373 to 324, and the leadership Senior Executive Service positions have dropped from 9 to 5. Over this same period, a single Office of Research has been divided into five separate institutes, and new responsibilities have been added, such as the expansion of technology programs and interagency initiatives. There is an important role for professional staff in a research agency. There is no substitute for it, nor any excuse for continued failure to address the problem.

The issue addressed in recommendation 4 is practical administration and accountability. The existing law creates expectations and structures that simply cannot be fulfilled under the current circumstances. The effects of lack of funds and staff are immediate and real. Statutory and management changes that will bring expectations and resources into better alignment—and do so around the Board priorities for learning by all students, especially in reading and mathematics—are urgently needed.

> ***Recommendation 5: Stability and professionalism in directing research*—A chief research officer for the U.S. Department of Education should be appointed by the President for a 6-year term and should report directly to the Secretary.**

In its 1999 recommendations, the Board proposes that the Congress create a focal point for research leadership that can span across administrations.[9] The paper argues that the issues of quality across the agency, coordination of work internally and collaboration externally, and the substantive development of the research agenda call for continuing supervision, mentoring, and quality review. It would be highly desirable to build into the Department the means for stabilizing a profes-

sional research function that offers some insulation from constant changes in leadership and course of direction, even appearances of politically inspired or ideological research agendas.[10]

Board members have considered the testimony of several individuals before congressional committees, or of others who made their recommendations in writing, that concur with the need for such a position. Some suggest a "commissioner" (in a form similar to that of the National Center for Education Statistics), appointed by the President, but located in OERI alongside the National Center for Education Statistics (NCES). Witnesses have called for appointment of individuals with distinguished backgrounds in research and development or in evaluation. Several have suggested presidential appointment.

The Board recommends creation of a chief research officer position in the Department, one that would require appointment by the President and confirmation by the Senate, and provide a 6-year term of office. The incumbent would report directly to the Secretary. There would no longer be an Assistant Secretary appointee serving at the pleasure of the President. This arrangement draws from the administration's proposal and also from precedents in other scientific agencies, such as the National Science Foundation, but adapts them to the responsibilities of the U.S. Department of Education. It would provide a critical measure of leadership, professionalism, independence, continuity, and stability long needed for the Department's research activities. It would provide a visible place for research in the Department and direct access to the Department's decisionmaking and policy setting functions.

Others might argue for retention of an Assistant Secretary as well as a research chief. For example, the U.S. Department of Commerce has an Under Secretary for Economic Affairs appointed to serve at the pleasure of the President. Within that office are a presidentially appointed Director of the Census, who also serves at the pleasure of the President, and a senior level career chief for the Bureau of Economic Analysis. Board members are not convinced that such an arrangement would be appropriate for leadership of research functions in Education. Members believe that adding a presidentially appointed research chief, while retaining the assistant secretary position, would result in confusion of responsibilities and could lead to work at cross purposes. It would, by its nature, keep the research chief—and the research function—in a subordinate position as compared with the principal officers of the Department, rather than reporting directly to the Secretary, as a primary Departmental officer should.

Recommendation 6: Policy board appointments and functions— **There should be a policy board comprised of policymakers, educators, researchers, and the general public. Members would be appointed to 6-year terms, initially staggered. Board responsibilities should include setting policies, reviewing conduct of the agency, fostering and overseeing collaboration among federal agencies that conduct research in education, advising the chief research officer of the Department and the Secretary, and reporting to the public on the condition of the agency as well as that of education research in the nation.**

This area of recommendations is perhaps most difficult for Board members to address, simply because of their status as current appointees. Nevertheless, the Board is making recommendations because some members of the public have asked, and because its members have now had considerable experience with the 1994 legislation, so their reflections on that experience should be useful to others.

In statements before Congress, and in other public proposals for OERI reauthorization, there have been a variety of suggestions about the nature and responsibility of public bodies attached to the research operations functions. Some have proposed a board with membership similar to that set out in the 1994 law, including researchers, school-based professional educators, and public members "knowledgeable about educational needs of the United States." Others have proposed a board modeled after the National Assessment Governing Board (NAGB)—which sets policy for the National Assessment of Educational Progress—with representation of different political parties and specifically including governors, legislators, chief state school officers, representatives of business and industry, and the general public, including parents. Appointment by the President has been proposed, as well as appointment by the Secretary, which would continue the 1994 provision. There have been several suggestions either to retain or alter the Board's responsibilities under that law.

The Board is not strongly concerned about whether appointments are made by the President or the Secretary. Both approaches have precedents in the Department, and either can work. An argument favoring presidential appointment, as the administration has proposed, is that approach is frequently followed in other research agencies. Secretarial appointment, as under the 1994 law, can sometimes better and more quickly respond to broad agency interests.

Members have decided opinions, however, about the composition of the Board. The Board should be above narrow partisanship, represent a diversity of perspectives, and reflect the good judgment of whoever has responsibility for appointments. Clearly it is possible to create a strong and representative board with approximately equal representation of researchers[11], practicing educators from all levels[12], and other members of the public[13], as under the current appointment categories. But there could be a much enhanced visibility and continuity for education research if individuals representing public officials, specifically including different political parties, were regularly a part of the Board's conversations. For example, including among the members two governors, each from a different political party; two state legislators, each from a different political party; and two other elected policy officials would provide this kind of visibility and enrichment of Board discussions. While the current Board's 15 members have usually been sufficient, the Board would find it appropriate to authorize an increase in the membership of a future education research board if there could be greater participation of public officials in it.

Finally, as to the functions of such a group, Board members would classify these in policy setting and prioritizing terms, as set out in the 1994 Act. The Board would endorse separate responsibilities for the new board, on the one hand, and the chief research officer on the other. The new board would not have any direct authority over day-to-day management, appointments, execution of policies, or setting the leadership tone for conduct of education research. It would, however, play the following roles:

- *establish policies on priorities* for education research investments and building capacity in education research, *and on standards* under which that work is conducted;

- *review conduct* of the agency, including documenting, analyzing, and judging agency actions under board policies and also reviewing awards of funds, either in the formulation stage or after completion of the work;

- *monitor and evaluate* the conceptualization and conduct of the chief research officer's program to connect research with practice so that student learning is advanced;

- *foster and oversee collaboration* among federal agencies that conduct research in education, and establish broad policies for the U.S. Department of Education role in relation to that of other agencies conducting education research;

- *advise the chief research officer* of the Department *and the Secretary* on education research; and

- *report to the public* on the condition of the agency and the progress of education research in the nation, drawing from the report of the chief of education research on the state of education research.

These are appropriate areas of responsibility for a Board whose purpose is to participate in setting directions and also to bring credibility to education research. A board performing these roles, with the long, overlapping, and diverse appointments recommended here, can also serve to make education research more stable and continuing. Whether the Secretary or the President will succeed in attracting exceptional individuals to a future research board will depend on the nature of the charge to that Board. The responsibilities must be of sufficient magnitude and complexity to make service on the board worthy of the prospective members' time.

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1. The Board's first policy recommendations paper, *Investing in Learning: A Policy Statement with Recommendations on Research in Education*, was published in June 1999. Copies are available from the office of the National Educational Research Policy and Priorities Board, Telephone: (202) 219-2324, fax (202) 219-1528, email: wanser_green@ed.gov, or consult the NERPPB Web Site (http://www.ed.gov/offices/OERI/NERPPB/).

2. Ibid., p. 27.

3. Ibid., p. 8.

4. Ibid., p. 17.

5. Transcript of a Brookings Press Forum, "Can We Make Education Policy on the Basis of Evidence? What Constitutes High Quality Education Research and How Can it Be Incorporated Into Policymaking?" Wednesday, December 8, 1999; Tom Loveless, The Brookings Institution, host; Paul Peterson, Harvard University, chair. The sponsors of this conference sought to advance use of randomized assignment of participants in "controlled experiments" as the preferred design for education research. Randomized experiments were described by several panelists as the gold standard for research. The transcript indicated the following:

> Only serious experimentation will yield the answers needed to improve American education. Use of randomized assignment research design has most frequently been publicized in medicine, but has been the basis for important studies in social policy areas such as employment and welfare. Sometimes education research is designed this way, but not very often. One panelist cited a study of 1200 research reports in the AERA journal over a 30-year period turned up 31 experiments from the 1200 studies. While no attempt was made to reach conclusions from the conference, individual panelists expressed their opinions, one of which that "people here in Washington who think about how to write our laws and administer our

laws" should ponder this. Public policy can be influenced by randomized experiments almost more certainly than any other research strategy. The randomized experiment has a capacity to influence public policy because there is much less controversy about what the finding is. It was asserted that randomized experiments increase the probability of use of research results compared with other forms of research.

Some instances in which randomized experiments have been employed to yield compelling findings in education include micro experiments to field test how children watch television, and how distractible they are for development of Sesame Street; the well-known Perry Preschool Project with Head Start children; the Philadelphia White Wing Foundation randomized experiments on the effect of awarding small scholarships to children from poor families who achieve at high levels in school; and introduction of standardized testing in Irish schools. Several speakers argued against some of the reasons frequently cited to explain why randomized experiments are infrequently used in education—especially emphasizing a culture of research in schools of education that has evolved over the past three or four decades, which were described as knowledge growth based on craft principles and not scientific principles. These include: a belief that experiments can't be done in schools; a belief that experiments are unethical because they involve withholding potentially a share of educational practices from some children who might need them; a belief that educational interventions can't be standardized; there are better methods for evaluating educational interventions; governments and foundations have not really pressed for quality evaluation of what works in education.

One panelist set out several conditions when randomized assignment experiments are the appropriate research design, including: if one wants to know whether the program or reform makes a difference; whether the program under study is sufficiently different from business as usual; when participants in the research are not being denied access to an entitlement; when an important question is being addressed; when you can get cooperation; and when you have the resources and ability to do a quality study. To do a good job on randomized experiments, for example in the Title I compensatory education arena or Head Start, takes $5 to $10 million experiments.

6. Richard J. Murnane, Harvard University, and Richard R. Nelson, Yale University, in the *Journal of Economic Behavior and Organization 5 (1984)*, "Production and Innovation When Techniques are Tacit: The Case of Education." In an early 1980s study of input-output research as applied to education, Richard Murnane and Richard Nelson observe that variation in education practice is unavoidable and in fact is crucial to effective teaching. Their analysis bears directly on the conditions for conducting research in education:

> Effective teaching requires intensive problem solving activity, and creative and personalized responses to frequent unpredicted circumstances. It is clear that this interpretation, which we believe is the correct one, casts a shadow on the faith that what one teacher or school is doing with success, another can replicate with comparable effect. . . .school authorities, while able to provide the context within which teachers go about their jobs, they cannot control in any detail what a teacher does either through monitoring or through incentives. . . . Teaching, if it is to be done effectively, involves experimentation. Some children learn rapidly, others slowly; what is effective for one may not be effective for another. From time immemorial teachers have had to find out for themselves what works with which children and with which subject matter.

> . . . it is a mistake to think of educational R&D as like industrial or biomedical R&D. We think it is also a mistake to think of innovation in education exclusively, or even largely, as an activity conducted in specialized facilities by specialists in R&D. We also believe that it is inappropriate to judge the contributions that particular innovations have made to educational practice by surveying the extent to which particular sets of new blueprints are in use in different sites. . . . In summary, we believe that educational R&D should not be viewed as creating "programs that work," but rather as part of the problem solving, experimenting, evaluating, adapting to new contexts and goals, that always is going on in education. . . . Educational R&D provides a flow of ideas, broadly defined methods, evidence about what is being tried out in different settings and about how well particular initiatives have worked in these settings, that enrich capabilities for the experimentation and problem solving that go on in individual school systems, schools and classrooms.
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> Thus, the relevant question is not "how widespread is the use of the modern physics package, or the new math package, and what have been the effects of use of these packages on performance." Rather, one might ask "what are the ways in which the new math and the modern physics ideas have influenced what goes on in classrooms, and in what ways, and in what contexts have these individual innovations enabled teachers to teach and students to learn more effectively." . . . What will work and what will not work varies from situation to situation. Much problem solving and fine tuning inevitably must go on in the particular school and classroom, and thus what someone else has done successfully can provide only gross guidance as to what might (or might not) be effective in a different context.

7. Investing in Learning, p. 41.

8. Ibid., p. 21.

9. Ibid., p. 42.

10. Ibid., p. 41.

11. The Board includes in the definition of researchers those from the social and behavioral sciences and other fields who can make important contributions to student learning.

12. Educators include teachers and administrators at all levels of education.

13. Other members in the current Board appointment categories are: "parents with experience in promoting parental involvement in education, chief state school officers, local educational agency superintendents, principals, members of state or local boards of education or Bureau-funded (that is, Bureau of Indian Affairs) school boards, and individuals from business and industry with experience in promoting private sector involvement in education."

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